

YEAR 1900

Seven storms were found to have occurred in 1900. Tracks for these storms are presented in Fig. 3.

Storm 1, 1900 (Aug. 27- Sept. 15), H.

This is the well-known hurricane which caused a disaster in Galveston, Tx. by killing at least about 8,000 people (Rappaport and Fernandez-Partagas, 1995). This is the largest number of fatalities due to a hurricane in the United States.

The following information of meteorological or meteorological-related nature was found about this storm: 1) Extracted from 8 A.M. (E.S.T.) daily weather maps: Aug. 27, ship near lat. 19 N., long. 48 W., wind E.N.E. force 4, barometer 30.03 inches; ship near lat. 17 N., long. 46 W., wind E.N.E. force 5, barometer 29.94 inches. Aug. 28, ship near lat. 19.7 N., long. 49 W., wind E. force 4; ship near lat. 14.7 N., long. 48 W., wind S.S.W. force 6. Aug. 29, ship near lat. 14.7 N., long. 52 W., wind S. force 4, barometer 29.94 inches; ship near lat. 18.7 N., long. 52 W., wind E. force 4; barometer 29.94 inches. Aug. 30, Barbados, wind S.W. force 2, barometer 29.92 inches; Martinique, wind N.W. force 4, barometer 29.91 inches; Dominica, wind N.E. force 2, barometer 29.90 inches; St. Kitts, wind N. force 4, barometer 29.93 inches; ship near lat. 17 N., long. 58 W., wind S.E. force 6, barometer 29.88 inches; ship near lat. 13 N., long. 56 W., wind S. force 2, barometer 29.94 inches. Aug. 31, St. Kitts, wind E. force 5, heavy rain, barometer 29.94 inches; San Juan, wind N.E. force 4, barometer 29.90 inches; ship near lat. 20 N., long. 63 W., wind E. force 6, barometer 29.77 inches (obviously too low); Santo Domingo, wind N. force 2, barometer 29.96 inches (Historical Weather Maps, Aug. 1900). 2) Extracted from 8 A.M. (E.S.T) daily weather maps: Sept. 1, Turk Is., wind N.N.E. force 3, barometer 29.94 inches; Santo Domingo, wind N. force 2, barometer 29.90 inches; San Juan, wind S.E. force 4, barometer 29.91 inches; Santiago de Cuba, wind N. force 1, barometer 29.88 inches; Port-au-Prince, wind N.N.W. force 3, barometer 29.84 inches. Sept. 2, Santiago de Cuba, wind N. force 2, barometer 29.80 inches, Port-au-Prince, wind W. force 2, barometer 29.77 inches (difficult to read off the map); Santo Domingo, wind S.E. force 1, barometer 29.85 inches; Turk Is. wind E. force 5, rain, barometer 29.88 inches; ship near lat. 22, long. 73, wind E. force 5. Sept. 3, Camaguey, wind N.E. force 2, barometer 29.82 inches; Santiago de Cuba, wind S.E. force 1, barometer 29.81 inches; ship near lat. 20 N., long. 74 W., wind S. force 5, barometer 29.91 inches; a second ship near lat. 20 N., long. 74 W., wind S. force 7, barometer 29.88 inches; Kingston, wind E. force 2, barometer 29.85 inches. Sept. 4, Cienfuegos, wind N.E. force 2, barometer 29.80 inches; Camaguey, wind S. force 3, rain, barometer 29.79 inches; Santiago de Cuba, wind S.E. force 3, heavy rain, barometer 29.89 inches. Sept. 5, Cienfuegos, wind S. force 5, barometer 29.64 inches; ship near lat. 24.3 N., long. 79.3 W., wind S.E. force 8, barometer 29.62 inches; Havana, wind N.N.W. force 4, barometer 29.63 inches; Key West, wind N.E. force 4, barometer 29.59 inches. Sept. 6, Key West, wind S. force 5, barometer 29.60

inches; Havana, wind S.W. force 4, barometer 29.66 inches; Tampa, wind N.E. force 3, barometer 29.68 inches (difficult to read off the map). Sept. 7, Port Eads, wind N.E. force 8, rain; ship near lat. 25 N., long. 87 W., wind S.S.W. force 8. Sept. 8, Galveston, wind N. force 5, barometer 29.54 inches; Port Eads, wind S.S.E. force 8, barometer 29.61 inches (Historical Weather Naps, Sept. 1900). 3) Mr. Francis Watts furnished the following observations taken at the Government Laboratory, St. Johns, Antigua, on Aug. 30, 1900: 9 A.M., wind N.E. force 2, barometer 29.96 inches; 11:50 A.M., barometer 29.94 inches; noon, wind N.N.W.; 12:50 P.M., barometer 29.91 inches; 2:05 P.M., barometer 29.88 inches; 3 P.M., wind N. force 3, barometer 29.88 inches; 3:25 P.M., barometer 29.84 inches; 6 P.M., wind W.; 8 P.M., wind S.W. About 10 P.M. a thunderstorm sprung up to the S.W. and came up over the land, appearing to be most severe over the region S.W. of St. Johns Harbor and generally within a radius of 3 miles of St. Johns. It died away soon after midnight (Aug. 30-31). Maximum rainfall amounts were 2.60 inches at Landfords, 2.50 inches at Skerretts, 2.50 inches at Thibuos Jarvis and 2.00 inches at Yaptons (Monthly Weather Review, Aug. 1900) 4) Maximum wind velocity at Basseterre, St. Kitts was S.E. 36 mph on Aug. 31; it was N.E. 43 mph at San Juan also on Aug. 31 (Monthly Weather Review, Aug. 1900). 5) On Sept. 1, Father Gangoiti, the director of the Belen College Observatory gave to the press a note indicating that, among the observations lately received from the Antilles, only those of yesterday afternoon vaguely suggested the existence of a small tempest to the S.W. of Santa Cruz (St. Croix). He added that on the morning of Sept. 1 the storm was still in its formative stages and started to influence the low level currents at Santiago de Cuba (Sarasola, 1928). 6) A disturbance was central S.S.W. of Puerto Rico last night with a W.N.W. tendency. Thus far it has developed but moderate energy and cautionary advices to this effect have been sent to southeastern Cuba and the northern portion of the Lesser Antilles (The New York Times, Sept. 1, 1900, p.3, col.4). 7) The tropical disturbance noted Friday evening (Aug. 31) was apparently central last night near the E. end of Cuba but as yet has developed but little force (The New York Times, Sept. 2, 1900, p.2, col.7). 8) Father Gangoiti's press note of Sept. 4 stated: "Barometers continue relatively low over the island (Cuba) and the low pressure which covers an extensive area from Santiago de Cuba to Pinar del Rio caused widespread showers and downpours yesterday. Upper and low currents observed from different places of the island show many irregularities without a center which regulate them, and an insignificant pressure gradient is also observed" (Sarasola, 1928). 9) The tropical disturbance was still apparently central S. of Cuba last night, and has increased slightly in intensity (The New York Times, Sept. 3, 1900, p.3, col.7). 10) The tropical disturbance still persists to the S. of Cuba with practically unchanged intensity (The New York Times, Sept. 4, 1900, p.5, col.2). 11) The tropical storm was moving over western Cuba in a northerly direction last and had increased somewhat in intensity. It has thus far caused rains through a portion of Cuba and brisk to high N.E. winds which have extended as far N. as Jupiter. At Santiago de Cuba 16.56 inches of rain has fallen. Storm signals are displayed on the

Gulf and Atlantic coasts from Cedar Keys to Miami (The New York Times, Sept. 5, 1900, p.5, col.3). 12) Belen College Observatory, Sept. 5, 11:40 A.M.: We have been under the influence of a tempest over the South Sea (the Caribbean) since Sunday (Sept. 3), with the largest axis of the ellipse oriented E.-W., which little by little has moved northward to abnormally recurve, causing periods of calm from Cape Cruz to Pinar del Rio at least. The barometer continued dropping at Cienfuegos until today at 5 A.M. At 2 A.M. it registered 753.9 millimeters (29.68 inches) and at 5 A.M. reached 753.1 millimeters (29.65 inches), accompanied by heavy showers and strong S.W. wind. The tempest gained some intensity yesterday afternoon and its main nucleus moved inland during the night, probably near the border of the provinces of Santa Clara and Puerto Principe (Camaguey), and it is now approximately to the S. of Florida. L. Gangoiti (Diario de la Marina, Havana, Oct. 5, 1900, evening edition. p.2, col.3). 13) Weather Bureau, Sept. 5, 10 A.M. The tempest has greatly increased in intensity and is now to the E. one-quarter N.E. of Havana, moving to the N. one-quarter N.E. (Diario de las Marina, Havana, Sept. 5, 1900, evening edition, p.2, col.3). 14) The Imparcial, of Cienfuegos, states that the showers that felt there, from 5:15 A.M. to 7:30 A.M. (Sept. 5) were very heavy. Pueblo Grifo, a suburb, was flooded, its habitants being helped by firemen and neighbors. At 9 A.M. Don Jose Veras's residence (near Paseo de la Reina and Lazareto) was flooded. An old lady and her granddaughter were in danger of perishing there but were saved (Diario de la Marina, Havana, Sept. 7, 1900, evening edition, p.2, col.3). 3) The minimum pressure recorded at Havana (Belen College Observatory) in association with this storm was 749.0 millimeters (29.49 inches) and occurred on Sept. 5 (Sarasola, 1928). Author's note: According to Weather Bureau (1901), the minimum pressure at the Weather Bureau Office, Havana, Cuba, was 29.48 inches, or one hundredth of an inch lower than at the Belen College Observatory. 16) Havana, Sept. 6. The mayor of Trinidad, Province of Santa Clara, has wired to the Military Government from Casilda for assistance, claiming that a cyclone yesterday destroyed all the crops of the district and that the people are destitute (The New York Times, Sept. 7, 1900, p.1, col.4). 17) Weather Bureau, Sept. 6. A telegram, dated on Sept. 5, was received from Santa Cruz del Sur, indicating that the wind there was from the S.E. at 10 mph. At 3 P.M. (presumably on Sept. 6), Key West sent a cablegram, informing that the tempest was over and that the sea had subsided. At 8 A.M. Sept. 1 the storm center was about 150 miles to the E. one-quarter S.E. of Santo Domingo; at 8 A.M. Sept. 2 it was about 150 miles to the E.S.E. of Santiago de Cuba. At 8 A.M. Sept. 3, the center was to the W. of Santiago de Cuba. On the morning of Sept. 4 it was to the S.E. one-quarter E. of Cienfuegos. During the 24 hours ending at 8 P.M. Sept. 4 the maximum wind velocity was E. 24 mph at Havana and N.W. 20 mph at Cienfuegos. On the morning of Sept. 5 the center was E. one-quarter N.E. of Havana, and during the 24 hours ending at 8 P.M. Sept. 5 the maximum winds were: S. 26 mph at Puerto Principe (Camaguey), S. 38 mph at Cienfuegos and N.W. 30 mph at Havana. From 8 P.M. Sept. 5 to 8 P.M. Sept. 6, the maximum wind velocities were: S. 20 mph at Puerto Principe (Camaguey), S. 34 mph. at Cienfuegos and W. 18 mph at Havana. From

8 A.M. Sept. 1 to 8 A.M. Sept. 6, 22 inches of rain felt at Santiago de Cuba, 5.26 inches at Puerto Principe (Camaguey), 5.16 inches at Cienfuegos and 0.89 at Havana (Diario de la Marina, Sept. 7, 1900, evening edition, p.2, col.3). 18) Sept. 3-4. 1900. The Galveston cyclone. It passed over Cuba on Sept. 3-4, with very weak intensity. It gained hurricane force in the Gulf (of Mexico) and destroyed Galveston on Sept. 8 (Sarasola, 1928). Author's note: Actually taken from the catalog of Cuban cyclones by M. Gutierrez-Lanza which is included in Sarasola (1928). 19) Rain storm at Las Villas in Sept. 1900, which later became the Galveston cyclone (Martinez-Fortun, 1942). Author's note: In some places of Las Villas the rain storm was of great proportions, La Patria, a newspaper from Trinidad which was quoted in Diario de la Marina, Sept. 11, 1900, evening edition, p.2, col.2, stated that it had not rained there for years as it did on Sept. 5-6. 20) Some maximum wind velocities at U.S. Weather Bureau stations in the West Indies were as follows: San Juan, S. 35 mph on Sept. 1; Santo Domingo, S. 27 mph on Sept. 3; Puerto Principe (Camaguey), S. 25 mph on Sept. 5; Cienfuegos, S. 38 mph on Sept. 5 (Monthly Weather Review, Sept. 1900). 21) Some maximum wind velocities in Florida were as follows: Key West, N.E. 40 mph on Sept. 5; Jupiter, E. 48 mph on Sept. 6; Tampa, N.E. 28 mph on Sept. 5 (Monthly Weather Review Sept. 1900). Author's note: According to observations read off the original Key West record, the maximum velocity of N.E. 40 mph occurred there between 8 A.M. and 8 P.M. Sept. 5, and by the latter time the wind had dropped to 6 mph. A secondary maximum velocity of S. 36 mph was recorded at Key West between 8 P.M. Sept. 5 and 8 A.M. Sept. 6. 22) Minimum pressures for Sept. 1900 which were associated with this storm: Key West, 29.42 inches; Jupiter, 29.68 inches; Tampa, 29.59 inches (Weather Bureau, 1901). 23) The tropical storm was central last night near Key West and has increased greatly in intensity. The storm has caused N.E. gales over southern Florida and is moving slowly northward. The storm will cause high winds and general rains over the eastern portion of the country and will probably terminate the high temperature period (The New York Times, Sept. 6, 1900, p.2, col.7). 24) Cloud types and their direction of movement as observed at various places in Florida: Key West, Sept. 6 morning), stratocumulus from the S.; Sept. 6 (evening), stratus from the S.; Sept. 7 (morning), nimbus from S.; Sept. 7 (evening), stratocumulus from S. Jupiter, Sept. 6 (morning), nimbus from E.; Sept. 6 (evening), stratus from S.; Sept. 7 (morning), stratus from S.E.; Sept. 7 (evening), stratus from S. Tampa, Sept. 6 (morning), nimbus with no movement; Sept. 6 (evening), stratus from S.E.; Sept. 7 (morning), altocumulus from S.E.; Sept. 7 (evening), cumulus from S.E. (Monthly Weather Review, Sept. 1900). 25) In previous published reports of the storm of 1900 the storm path shows a strong deflection toward the S.W. Florida coast, but reports received from vessels and other sources after those publications indicated the fact that this deviation to the right was not so strong as has been supposed, and the track as here chartered is thought to represent more nearly the true conditions. It was carefully plotted from all available observations (Frankenfield, 1915). Author's note: The content of the above item was taken from an article published in the Monthly Weather Review, Aug. 1915, in

which H.C. Frankenfield compared a hurricane of 1915 with the Galveston hurricane of 1900. The article is accompanied by a map showing the tracks for both storms. As read off the maps, positions for Sept. 5 and Sept. 6 along the Frankenfield's track for the 1900 hurricane were near lat. 24.3 N., long. 82 W. and near lat. 25.5 N., long. 84 W., respectively. Those positions imply that the storm center passed to the S. and W. of Key West, and not to the E. of that place as suggested by some other tracks (Garriott, 1900; Monthly Weather Review, Sept. 1900). The storm tracks modifications made by Frankenfield (1915) were taken into account in later versions of the track (Mitchell, 1924; Cline, 1926; Tannehill, 1938; Neumann et al., 1993). 26) Many exciting reports were current in the city (Tampa) yesterday about the work of the high winds at Key West. They were mostly without foundation. A dispatch dated last night about 8 P.M. reported the velocity of the wind at Key West at 40 mph. Jupiter at the same hour reported 36 mph. Tampa had unusually high winds all day yesterday, but the velocity was not sufficient to do damage. The Weather Bureau kept N.E. storm signals flying all day in accordance with bulletings from Washington which kept observer Hass-Haggen advised of the location and condition of the gale (The Morning Tribune, Tampa, Sept. 6, 1900, p.1, col.3). 27) The "Salamanca" left Havana on Sept. 4 and next afternoon the barometer began to fall. About 4 P.M. the clouds have become very dark and hung so low that they seemed to touch the water. The wind, which was blowing at a fearful rate, tore the covers of the lifeboats and carried away the awnings. Capt. Reynolds headed the steamer out to sea and, for the 36 hours that the storm lasted, the engines were tested at their utmost capacity in their struggle against the fury of the storm (The New Turk Times, Sept. 12, 1900, p.2, col.5). 28) Weather Bureau, Sept. 6. The tempest was located about 150 miles to the N. one-quarter N.E. of Key West at 8 A.M. this morning (Diario de la Marina, Sept. 7, 1900, evening edition, p.2, col.3). Author's note: According to the content of item 25), the above position should be in error. 29) Key West, Sept. 10. Barque "Paul", from Cuba to New York, is ashore near Jupiter Light (The Times, London, Sept. 11, 1900, p.4, col.5). 30) The tropical storm has continued slowly northwestward and was apparently central last night over the eastern Gulf and has still a tendency toward a N.W. direction (The New York Times, Sept. 7, 1900, p.2, col.2). 31) Key West, Sept. 7. The steamer "Comal", from New York Sept. 1 to Galveston, has arrived here this morning having encountered very heavy weather after passing Jupiter Light. She reports 4 vessels ashore on the coast: a bark at Turtle Harbor, a barkentine near French Reef, a schooner apparently anchored on the reef and a square rigged vessel near Sombrero Light (The New York Times, Sept. 8, 1900, p.1, col.6). 32) Miami, Fl, Sept. 8. Berkentine "Culdoon", registered at St. John, New Brunswick, is ashore 5 miles S. of Caryfort Reef, which is about 35 miles S. of Miami. The "Caldoon" sailed from Pascagoula, Miss. on Aug. 23 for Rosario, Argentine Republic. The vessel encountered the recent hurricane, which blew with a velocity of 90 to 100 mph, off the Florida coast, at 10:20 A.M. Sept. 5 and after loosing her rudder and nearly all canvas, was hurled upon the rocks at 10.20 P.M. She was driven by the force of the waves and is lying in 12 feet of water (The Morning Tribune,

Tampa, Sept. 9, 1900, p.1, col.6). 33) West Palm Beach, Sept. 7. Considerable damage has been done in this section by the hurricane which has been blowing here for the last few days (The New York Times, Sept. 8, 1900, p.1, col.6). 34) Description of the storm furnished by Capt. Halsey of the steamship "Louisiana": "We left New Orleans at 9:20 A.M. Sept. 5 and passed the bar at 5:22 P.M. that afternoon. The warning flag was up at Port Eads when we ran out. The wind was hard from the E.N.E. and the barometer was 29.87 (inches). By 6 o'clock the next morning (Sept. 6) the barometer was 29.60 (inches) and falling, and the wind was blowing a gale from the N.N.E. and circling to the N. At 10 o'clock the wind was N. and the barometer marked 29.25 (inches), and at 1 P.M. the barometer had fallen to the remarkable figure of 28.75 (inches) and we were in the storm center. I do not like to speak anything outside of the log record, but I think the wind was blowing at a rate of more than 100 mph. It went rapidly from the N.N.E., then to N.N.W., W. and S. We were almost half way across the Gulf when the storm center passed us and the sea which it raised was so severe that we hove from 12 to 3 o'clock. The gale held until about 12 o'clock that night (Sept. 6-7), when it began to moderate (Monthly Weather Review, Sept. 1900). Author's note: A similar description was published in The New York Times, Sept. 11, 1900, p.3, col.1. The newspaper added that the ship was in lat. 26 33 N., long. 85 47 W., about half way between the mouth of the Mississippi River and Tortugas and that Capt. Halsey believed that the wind had a velocity of 150 mph. 35) The "El Dorado" left New Orleans at 4:40 P.M. Sept. 5. At noon Sept. 6 the wind was blowing a N.E. gale. The storm increased in violence and for 3 hours the ship was hove to. About 6 P.M. Capt. Baker decided that it was advisable to run before the wind and did so until the storm abated (The New York Times, Sept. 12, 1900, p.2, col.5). 36) The ship "Concho" left Galveston on Sept. 5 and on the following day it ran into the S.W. corner of the storm. Capt. Rich, having warned by the falling of the glass that he was entering the storm, sought safety in running away (The New York Times, Sept. 13, 1900, p.2, col.1). 37) The steamship "Hyades" arrived (at New York) from Galveston. The ship left Galveston on Sept. 3. Early on the following Friday morning (Sept. 7) the ship ran into the teeth of the hurricane and had to heave to. The barometer dropped with marked rapidity that morning and at noon the vessel encountered the focus of the storm. The wind, which blew at first from the N.W., shifted around to S.E., and was accompanied by heavy rain. Tremendous seas were running up to noon of the following Sunday (Sept. 9) but the "Hyades" is a fine sea boat and she ran them well. One of the members of the crew said that the ship was in the middle of the Gulf when it encountered the hurricane (The New York Times, Sept. 20, 1900, p.2, col.6). 38) Selected observations taken at New Orleans, La. (90 degrees W. meridian time). Sept. 6, 6 P.M., barometer 29.82 inches, wind N.E. 14 mph; midnight (Sept. 6-7), barometer 29.78 inches, wind N.E. 15 mph; Sept. 7, 6 A.M., barometer 29.72 inches, wind N.E. 19 mph; noon, barometer 29.72 inches, wind N.E. 31 mph; 6 P.M., barometer 29.65 inches, wind N.E. 20 mph; midnight (Sept. 7-8), barometer 29.69 inches, wind N.E. 20 mph; Sept. 8, 6 A.M., barometer 29.70 inches, wind S.E. 15 mph; noon, barometer 29.80

inches, wind S.E. 25 mph (Cline, 1926). 39) Selected observations taken at Corpus Christi, Tx. (90 degrees W. meridian time). Sept. 7, 6 P.M., wind N. 11 mph; midnight (Sept. 7-8), wind speed 12 mph; Sept. 8, 6 A.M., wind speed 12 mph; noon, wind N.W. 18 mph; 6 P.M., wind N.W. 20 mph; midnight (Sept. 8-9), wind speed 20 mph (Cline, 1926). 40) Selected observations taken at Galveston, Tx. (90 degrees W. meridian time). Sept. 7, 6 P.M., barometer 29.69 inches, wind N. 11 mph; midnight (Sept. 7-8), barometer 29.72 inches, wind N. 16 mph; Sept. 8, 6 A.M., barometer 29.60 inches, wind N. 17 mph; noon. barometer 29.48 inches, wind N. 27 mph; 3 P.M., barometer 29.31 inches, wind N. 35 mph; 4 P.M., barometer 29.21 inches, wind N.E. 43 mph; 5 P.M., barometer 29.13 inches, wind N.E. 46 mph; 6 P.M., barometer 28.94 inches, wind N.E. 60 mph; 7 P.M., barometer 29.76 inches, wind direction N.E.; 8 P.M., barometer 28.55 inches, wind direction N.E.; 8:30 P.M., barometer 28.48 inches, center passed; 9 P.M., barometer 28.51 inches. wind direction E.; 10 P.M., barometer 28.76 inches, wind direction E.; 11 P.M., barometer 28.93 inches, wind direction S.E.; midnight (Sept. 8-9), barometer 29.00 inches, wind direction S.; Sept. 9, 1 A.M., barometer 29.10 inches; 2 A.M., barometer 29.21 inches; 3 A.M., barometer 29.27 inches; 4 A.M., barometer 29.31 inches; 5 A.M., barometer 29.34 inches; 6 A.M., barometer 29.31 inches; 9 A.M., barometer 29.50 inches; noon, barometer 29.58 inches; 6 P.M., barometer 29.63 inches (Cline, 1900). 41) Some cloud movement observations taken at various stations: Mobile, Sept. 6 (morning), cirrostratus and altostratus from N.E.; Sept. 6 (evening), altostratus and altocumulus from N.E.; Sept. 7 (morning), stratocumulus from E.; Sept. 7 (evening), cirrus from S.E., altocumulus, altostratus and stratocumulus from E.; Sept. 8 (morning), cirrus from S., cumulus from E.; Sept. 8 (evening), cirrocumulus from S., stratocumulus from S.E. New Orleans, Sept. 6 (morning), cirrostratus from E.; Sept. 6 (evening), altostratus from S.W.; Sept. 7 (morning), cirrostratus from S.E.; Sept. 7 (evening), nimbus from N.E.; Sept. 8 (morning), stratocumulus from S.E.; Sept. 8, (evening), stratocumulus from S.E. Galveston, Sept. 6 (evening), altostratus from N.E., stratocumulus from N.; Sept. 7 (morning), cirrus and altostratus from S.E.; Sept. 7 (evening), stratocumulus from N.E.; Sept. 8 (morning), stratus from N.; Sept. 8 (evening), nimbus from N.E.; Sept. 9 (morning), stratus from S.; Sept. 9 (evening), cirrus and altostratus from S.E. (Monthly Weather Review, Sept. 1900). 42) Maximum wind velocities at various stations: New Orleans, S.E. 47 mph on Sept. 8; Port Eads, E. 58 mph on Sept. 8; San Antonio, N.W. 30 mph on Sept. 9; Palestine, N.E. 30 mph on Sept. 9; Fort Worth, S.E. 52 mph on Sept. 9; Little Rock, S.E. 36 mph on Sept. 9; Shreveport, S.E. 28 mph on Sept. 9 (Monthly Weather Review, Sept. 1900). 43) Extracted from a report prepared by Dr. Isaac M. Cline, Local Forecast Official and Section Director, Weather Bureau, Galveston, Tx.: The wind during the forenoon of Sept. 8 was generally N., but oscillating, at intervals from 5 to 10 minutes between N.W. and N.E., and continued so until 1 P.M. After 1 P.M. the wind was mostly N.E., although as late as 6:30 P.M. it would occasionally back to the N.W. for one or two minutes at a time. The prevailing wind was from the N.E. until 8:30 P.M., when it shifted to the E., continuing from this direction until about 10 P.M. After

10 P.M. the wind was from the S.E. , and after about 11 P.M. the prevailing direction was from the S. or S.W. The directions after 11 P.M. are from personal observations. A storm velocity was not attained until about 1 P.M.. after which the wind increased steadily and reached a hurricane velocity about 5 P.M. The greatest velocity for 5 minutes was 84 mph at 5:15 P.M., with two miles at a rate of 100 mph. The anemometer blew away at this time and it is estimated that prior to 8 P.M. the wind attained a velocity of at least 120 mph. For a short time, about 8 P.M., just before the wind shifted to the E., there was a distinct lull, but when it came out from the E. and S.E. it appeared to come with greater fury than before. After shifting to the S. about 11 P.M., the wind steadily diminished in velocity, and at 8 A.M. in the morning of Sept. 9 was blowing at a rate of 26 mph from the S. The barometer commenced falling during the afternoon on Sept. 6 and continued falling steadily but slowly up to noon Sept. 8, when it read 29.42 inches. The barometer fell rapidly from noon until 8:30 P.M. Sept. 8, when it registered 28.48 inches, a fall of pressure of about one inch in eight and one-half hours. After 8:30 P.M. the barometer rose at the same rapid rate that had characterized the fall. The water rose at a steady rate from 3 P.M. until about 7:30 P.M., when there was a sudden rise of about 4 feet in as many seconds. I was standing at my front door, which was partly open, watching the water, which was flowing with great rapidity from E. to W. The water at this time was about 8 inches deep in my residence, and the sudden rise of about 4 feet brought it above my waist before I could change my position. The water had now reached a stage 10 feet above the ground at Rosenberg Avenue (Twenty-fifth street) and Q street, where my residence stood. The ground was 5.2 elevation, which made the tide 15.2 feet. The tide rose the next hour, between 7:30 and 8:30 P.M. near 5 feet additional, making a total tide in that locality of about 20 feet. These observations were carefully taken and represent to a few tenths of a foot the true conditions. Other personal observations in my vicinity confirm these estimates. The tide, however, on the bay or north side of the city did not obtain a height of more than 15 feet. It is possible that there was 5 feet of back water on the Gulf side as a result of debris accumulating 4 to 6 blocks inland. The debris is piled 8 to 15 feet in height. By 8 P.M. a number of houses has drifted up and lodged to the E. and S.E. of my residence, and these with the force of the wave acted as a battering ram against which it was impossible for any building to stand for any length of time, and at 8:30 P.M. my residence went down with about 50 persons who has sought it for safety, and all but 18 were hurled into eternity. Among the lost was my wife, who never rose above the water after the wreck of the building. I was nearly drowned and became unconscious, but recovered through being crushed by timbers and found myself clinging to my youngest child, who has gone down with myself and wife. Sunday, Sept. 9, 1900 revealed one of the most horrible sights that ever a civilized people looked upon. About 3,000 homes, near half the residence portion of Galveston, has been completely swept out of existence, and probably more than 6,000 persons had passed from life to death during that dreadful night. The correct number of those who perished will probably never be known, for many

entire families are missing. From the officers of the U.S. Engineer tug "Anna", I learn that the wind at the mouth of the Brazos River went from N. to S.W. by the way of W. This shows that the center of the hurricane was near Galveston, probably no more than 30 miles to the westward. The following towns have suffered great damage in the loss of life and property: Texas City, Dickinson, Lamarque, Hitchcock, Arcadia, Alvin, Marvel, Brazovia, Columbia and Wharton. Other towns further inland has suffered but not so seriously (Monthly Weather Review, Sept. 1900). 44) The tropical storm was still apparently central last evening quite close to the Texas coast. A special report received from Galveston at 3:40 P.M. showed a barometric pressure of 29.22 inches and a wind velocity of 42 mph from the N.E. (The New York Times, Sept. 9, 1900, p.3, col.6). 45) The tropical storm has passed the coast line, turning more to the N. and was central last night over North central Texas. Fort Worth reported a maximum velocity of 44 mph from the E. and a barometer reading of 29.46 inches Unofficial advices from Houston report a gale from 40 to 60 mph, doing much damage to city property (The New York Times, Sept. 10, 1900, p.8, col.4). 46) Dallas, Sept. 8. All Texas is in the state of doubt and uncertainty thought concerning the fate of Galveston Island and city. There is suspicion that an awful calamity rests behind the lack of information from the Gulf coast (The New York Times, Sept. 9, 1900, p.1, col.6). 47) Houston, Sept. 8. A hurricane accompanied by a heavy rain prevailed along the Texas coast and for 100 miles inland today. Galveston was cut off entirely and the last communication was at 4:30 P.M.. Last report indicates that the Gulf coast waters were encroaching rapidly on the beach and that the flood has extended into the residence portion of the city for several blocks. The wind is blowing 60 mph at Houston at midnight (Sept. 8-9) and great damage is being done to business houses and residences throughout the city (The New York Times, Sept. 9, 1900, p.1, col.6). 48) San Antonio, Sept. 8. A message received here by Jerry Gierrard announcing the death of his brother by drowning left Galveston at 8:15 P.M. and also indicated that the lower portion of the city was then flooded and people were huddle in higher ground in pouring rain for safety (The New York Times, Sept. 9, 1900, p.1, col.6). 49) New Orleans, Sept. 8. The storm which struck New Orleans last evening continued its fury its fury with heavy rain until daylight, prostrating telephone and telegraph wires in all directions. The highest tide and heaviest blow since 1893 prevailed at Bay St. Louis this morning. Lake Pontchartrain was a miniature sea all night (The New York Times, Sept. 9, 1900, p.1, col.6). 50) Houston, Sept. 9. A dispatch from San Antonio flashed over the wires informing Gov. Sayers that a messenger, at great risk of his life, reached Virginia Point from Galveston with the report that 2500 are probably dead as a result of the fearful storm (The New York Times, Sept. 10, 1900, p.1, col.4). 51) Dallas, Sept. 10. At Galveston the waters of the Gulf and the bay met, covering the island to a depth of from 6 to 12 feet. During the sudden flood the most terrific storm was raging, the wind blowing about 80 mph (The New York Times, Sept. 11, 1900, p.1, col.5). 52) Houston, Sept. 10. The records of the Weather Bureau at Galveston show that the wind attained a velocity of 84 mph when the instrument blew away, so it

is impossible to tell what maximum was. By 3 P.M. the waters of the Gulf and bay met and by dark the entire city was submerged (The New York Times, Sept. 11, 1900, p.1, col.5). 53) Dallas, Sept. 10. At Port Arthur, the water spread over the town but it did not reach enough depth to destroy buildings. At Sabine Pass the water reached a depth of about 3 feet but nothing, except small buildings near the waterfront, was washed away (The New York Times, Sept. 11, 1900, p.2, col.6). 54) New York, Sept. 10. Other reports from Galveston say that the town was struck by a wave and that the loss of life amounts to between 2500 and 3000. The water is 15 ft deep over Virginia Point. Heavy rain accompanied the hurricane. The cotton crop is nearly ruined as the storm swept the cotton belt of the State of Texas (The Times, London, Sept. 11, 1900, p.3, col.6). 55) New York, Sept. 12. Mr. Jones, the Mayor of Galveston, reports that 3000 persons have been killed and that 5000 families have been rendered homeless (The Times, London, Sept. 13, 1900, p.3, col.6). 56) New York, Sept. 13. Steamers "Comino", "Ramon de Larrinaga" and "Telesfora" are at their berths at Galveston damaged (The Times, London, Sept. 14, 1900, p.4, col.5). 57) Liverpool, Sept. 13. Telegram from Galveston states that ship "Kendal Castle" lies in 6 feet of water 8 miles up the bay; impossible to float without digging channel (The Times, London, Sept. 14, 1900, p.4, col.5). 58) Telegram from the captain of the "Norma" at Galveston: "Norma" seriously damaged; ship aground (The Times, London, Sept. 14, 1900, p.4, col.5). 59) New York, Sept. 17. Advices received from Houston state that, according to the latest list, 4078 persons perished at Galveston (The Times, London, Sept. 19, 1900, p.3, col.6). 60) Houston, Sept. 13. The loss of life at Galveston is now conservatively placed at 5000, while many believe that from 8000 to 10000 perished (The New York Times, Sept. 13, 1900, p.1, col.6). 61) Galveston, Sept. 12. The wind gauge recorded a two minute wind velocity of 100 mph and was then demolished by the hurricane. The Weather Bureau report estimates the maximum velocity of the wind at between 110 and 120 mph (The New York Times, Sept. 13, 1900, p.2, col.1). 62) After passing inland the storm lost force rapidly but again attained marked intensity on approaching the Great Lakes where it was attended by gales of great violence (Tannehill, 1938). 63) Some maximum wind velocities of at least gale force which were associated with the storm at high latitude: Green Bay, N.W. 45 mph on Sept. 11; Milwaukee, N.W. 40 mph on Sept. 11; Chicago, S.W. 72 mph on Sept. 11; Port Huron, S.W. 46 mph on Sept. 11; Grand Haven, N.W. 44 mph on Sept. 11; Detroit, S.W. 43 mph on Sept. 11; Toledo, S.W. 44 mph on Sept. 11; Cleveland, S.W. 60 mph on Sept. 12; Erie, W. 42 mph on Sept. 12; Oswego, W. 45 mph on Sept. 12; Buffalo, W. 78 mph on Sept. 12; Indianapolis, S.W. 48 mph on Sept. 11; New York, W. 65 mph on Sept. 12; Boston, W. 52 mph on Sept. 12; Northfield, S.W. 44 mph on Sept. 12; Eastport, N.W. 48 mph on Sept. 12 (Monthly Weather Review, Sept. 1900). 64) The West Indian storm which swept over Galveston last Saturday and Sunday, according to the Weather Bureau in Washington, reached eastern Iowa yesterday morning and on its way gathered new strength and increased intensity. It crossed the Mississippi and struck Lake Michigan. Passing over the country between Chicago and Fort Wayne, the storm moved in an E.N.E. direction towards the Atlantic. Chicago reported

a wind velocity of 84 mph late in the afternoon and similar reports came from other points. All through the entire lake region and along the Atlantic coast from Sandy Hook to Portland, signals were ordered out last night to warn shipping against high gales and dangerous winds from the N.W. (The New York Times, Sept. 12, 1900, p.1, col.4). 65) Boston, Sept. 12. The tropical storm swept New England today; the wind blew a 50- mph gale (The New York Times, Sept. 13, 1900, p.2, col.2). 66) The West Indian storm which has been the center of meteorological interest for the last 12 days was disappearing last night by the way of Cape Breton Island, the barometer at Sydney reading 29.02 inches. S. and S.W. gales resulted from this storm and yesterday they extended from the New Jersey coast northward. Boston reported a wind velocity of 52 mph from the W. and New York 64 mph from the W. During Tuesday night (Sept. 11) a maximum velocity of 80 mph was reported at Buffalo (The New York Times, Sept. 13, 1900, p.2, col.7). 67) Charlottetown, Prince Edward Island, Sept. 14. The Texas hurricane swept over this province Wednesday night (Sept. 12), causing immense damage, the full details of which are not available as wires are down throughout the island (The New York Times, Sept. 15, 1900, p.2, col.5). 68) St. John's, Newfoundland, Sept. 14. Tales of widespread destruction wrought by the Wednesday gale continue to pour in. Six vessels were wrecked at St. Pierre and 6 in Placenta Bay. It is also reported that 4 were lost at Renew's Harbor. 2 in the Straits of Belle Isle and 4 near Cape Bonavista (The New York Times, Sept. 15, 1900, p.2, col.5). 69) St. John's, Newfoundland, Sept. 17. A recent storm wrought great damage to the fishing fleet. Over 50 vessels were wrecked. At the present time the loss of life is small but several schooners are still missing (The Times, London, Sept. 18, 1900, p.3, col.5). 70) St. John's, Newfoundland, Sept. 22. An unknown American fishing vessel foundered on the Grand Bank during last week's storm and all the crew, 20 in number, perished. The French vessel "Thornley" foundered and 14 of her crew were drowned and 6 escaped. The schooner "Eddie" lost 3 men. The schooner "Dolphin" was dismasted and lost 5 men. The bark "Mary Hendry", from New York for St. John's, arrived; she was dismasted in the gale, her decks were swept, her bulwarks smashed and much gear was carried away (The New York Times, Sept. 23, 1900, p.1, col.5). 71) St. John's, Newfoundland, Sept. 19. Forty-two fishing vessels were ashore in the Straits of Belle Isle, and as many as 30 will be totally lost. This is in addition to the disasters previously reported (The New York Times, Sept. 20, 1900, p.7, col.2). 72) The steamer "New York" arrived at New York Saturday night (Sept. 15) and reports encountering a severe storm on the eastern edge of the Newfoundland Banks Wednesday night, Sept. 12 (The New York Times, Sept. 17, 1900, p.2, col.2). 73) Steamer "Bremenhaven". which arrived from Antwerp, reports that on Sept. 14, between long. 46 50 W. and 49 27 W. she experienced a very heavy gale from S.W. (The New York Times, Sept. 20, 1900, p.7, col.2). Author's note: The day is suspected to be in error. For the range of longitudes given, Sept. 13 would fit much better with the storm having occurred at Newfoundland in the night of Sept. 12-13 and with the fast motion of the weather system. 74) Storm of Sept. 5-9, 1900. It was minor in Florida Straits on Sept. 5-6. It was

minimal in Louisiana on Sept. 7. It was extreme on the Upper Texas coast on Sept. 8-9. Famous Galveston Storm, 6,000 killed, damage \$ 30,000,000 (Dunn and Miller, 1960). 75) Storm of Aug. 27- Sept. 22, 1900. Atlantic, Haiti, Cuba, Galveston. Disaster at Galveston, Sept. 8. Map displaying a track for this storm which showed a first location near lat. 17 N., long. 45 W. on Aug. 27. According to this track, the storm entered the northeastern Caribbean Sea on Aug. 31, made landfall on the southern coast of Hispaniola late on Sept. 1, crossed over that island and Cuba over the period Sept. 2-5, emerged into the Florida Straits on Sept. 5 and moved into the Gulf of Mexico on Sept. 6. The storm reached Galveston by the evening of Sept. 8 and then curved northward and northeastward, passing over the Great Lakes region on Sept. 11 and early Sept. 12. By the morning of Sept. 13, it was located over the eastern coast of Newfoundland (Tannehill, 1938). 76) Map showing a track for the storm. Positions along the track were: Sept. 4 (morning), near lat. 19 N., long. 80.5 W.; Sept. 5 (morning), near lat. 23 N., long. 81.5 W.; Sept. 5 (evening), near lat. 24.5 N., long. 81.5 W.; Sept. 6 (morning), near lat. 26.3 N., long. 82.5 W.; Sept. 7 (morning), near lat. 27.3 N., long. 85.5 W.; Sept. 7 (evening), near lat. 27.7 N., long. 89 W.; Sept. 8 (morning) near lat. 28 N., long. 92 W.; Sept. 8 (evening), near lat. 29 N., long. 94.7 W.; Sept. 9 (evening), near lat. 32 N., long. 97.5 W.; Sept. 10 (morning), near lat. 36 N., long. 97.7 W.; Sept. 10 (evening), near lat. 39.5 N., long. 97.5 W.; Sept. 11 (morning), near lat. 41.5 N., long. 93.7 W.; Sept. 11 (evening), near lat. 42.7 N., long. 86.5 W.; Sept. 12 (morning), near lat. 45.5 N., long. 74 W.; Sept. 12 (evening), near lat. 46.5 N., long. 60.5 W. A second map showing another track for the storm. This track was started about 200 miles S. of Puerto Rico in the morning of Sept. 1, reached a point about 150 miles S. of central Hispaniola by morning of Sept. 2 and a point about 50 miles S.W. of Jamaica by morning of Sept. 3. For the period Sept. 4-8, this second track practically reproduced the first one. Then, the second track is terminated near San Antonio, Tx. in the morning of Sept. 9 (Monthly Weather Review, Sept. 1900). Author's note: The two tracks above showed the unrealistic deviation to S.W. Florida that Frankenfield (1915) pointed out and corrected (item 25). 77) A Sept. 1900 storm appeared near lat. 13 N., long. 63 W., recurved near lat. 24 N., long. 95 W. and disappeared over mid-ocean. Map showing a track for this storm. Daily positions along the track were read off the map as follows: Sept. 1, near lat. 15 N., long. 65.5 W.; Sept. 2, near lat. 15.5 N., long. 70.5 W.; Sept. 3, near lat. 17.5 N., long. 78 W.; Sept. 4, near lat. 20 N., long. 80.5 W.; Sept. 5, near lat. 23.5 N., long. 81 W.; Sept. 6, near lat. 26.3 N., long. 82 W.; Sept. 7, near lat. 28 N., long. 88 W.; Sept. 8, near lat. 29.3 N., long. 94.3 W.; Sept. 9, near lat. 29.7 N., long. 97 W. (Garriott, 1900). Author's note: The recurvature near lat. 24 N., long. 95 W. is in error because it is not supported by the track given in Garriott (1900). This track was found to have some similarity with the second track in item 76); however, the Sept. 8 position in Garriott (1900) was found to be in serious error because the storm center did not reach the Galveston area until late Sept. 8. The track given in Garriott (1900) also reflected the deviation towards S.W. Florida which was discussed and corrected by

Frankenfield (1915) and referred to in item 25). 78) Map showing a partial track for the storm, starting near lat. 22 N., long. 77 W., entering the Gulf of Mexico between Havana and Key West on Sept. 5 and reaching Galveston in the night of Sept. 8 (Cline, 1926). Author's note: This partial track eliminated the spurious deviation towards the S.W. Florida coast discussed in Frankenfield (1915) and referred to in item 25). 79) A storm was first observed near lat. 16 N., long. 46 W. on Aug. 27, 1900 and lasted 29 days; it recurved near lat. 38 N., long. 97 W. and it was last observed near lat. 50 N., long 70 E. (Mitchell, 1924). Author's note: A track for this storm which is also included in Mitchell (1924) was found to be quite similar to the one shown in Neumann et al. (1993) and to have, in addition, some similarities with the one displayed in Tannehill (1938) and referred to in item 75). These three tracks eliminated the spurious deviation towards S.W. Florida which was first addressed by Frankenfield (1915) and referred to in item 25).

The content of some of the above items allowed the author of this study to introduce some adjustments along the track in Neumann et al. (1993) over the period Aug. 27- Sept. 7; the remaining of the track in the above publication (Sept. 8-15) was kept unchanged because, in general, it was found to be supported by information contained in other items. On the basis of information in item 1), the track was slightly adjusted to the S. over the period Aug. 27-29, resulting in the following 7 A.M. estimated positions by the author of this study: Aug. 27, near 15.3 degrees N., 44.7 degrees W.; Aug. 28, near 16.0 degrees N., 49.3 degrees W.; Aug. 29, near 16.5 degrees N., 53.7 degrees W.; these positions were about 80 miles to the E.S.E., 70 miles to the E.S.E. and 60 miles to the E.S.E. of the corresponding ones in Neumann et al. (1993). The 7 A.M. Aug. 30 position in the above publication, which was near 17.0 degrees N., 59.3 degrees W., was found to satisfy information in item 1) and, therefore, was not modified; however, information in item 3) suggested that the storm center passed just N. of Antigua (not over that island) in the evening of Aug. 30 and the track was consequently adjusted to the N. by a few miles during late Aug. 30 in order to account for that suggestion. The author's 7 A.M. Aug. 31 position was near 17.3 degrees N., 64.7 degrees W. and represented an adjustment to the S. by a few miles of the corresponding position in Neumaann et al. (1993); the adjustment was introduced in order to satisfy information for the afternoon of that day (item 5) which suggested, though vaguely, that the storm was then to the S.W. of St. Croix. On the basis of information in items 2), 17) and 18), the author of this study estimated the following 7 A.M. positions for the period Sept. 1-4): Sept. 1, near 17.7 degrees N., 68.3 degrees W.; Sept. 2, near 19.0 degrees N., 72.3 degrees W.; Sept. 3, near 20.0 degrees N., 76.0 degrees W.; Sept. 4, near 21.3 degrees N., 78.3 degrees W.; these positions were found to be about 50 miles to the S.E., about 50 miles to the E., about 30 miles to the E. and about 70 miles to the E. of the corresponding positions in Neumann et al. (1993). The author's 7 A.M. Sept. 5 position was based on a careful analysis of information contained in items 2), 12), 13), 15), 17), 21) and 22) and was estimated near 23.0 degrees N., 80.7 degrees W. ; this position was found to be about 50 miles to the E.S.E. of the

corresponding one in Neumann et al. (1993). The 7 A.M. Sept. 6 position in the above publication was found to fit the space-time continuity derived from a position near Key West in the evening of Sept. 5, which the author estimated on the basis of the wind drop information contained in his note corresponding to item 21) and information in item 23), and the position where the steamship "Louisiana" passed very near the center of the storm around 1 P.M. Sept. 6 (item 34 and corresponding author's note). Therefore, the 7 A.M. Sept. 6 position in Neumann et al. (1993), which was near 25.5 degrees N., 84.3 degrees W., was kept unchanged. The author's 7 A.M. Sept. 7 position was estimated near 27.0 degrees N., 88.7 degrees W., primarily on the basis of information for that day in item 2) and, to a lesser extent, in item 38).; this position was found to be about 40 miles to the N. of the corresponding one in Neumann et al. (1993). As indicated before, the remaining portion of the track in the above publication (Sept. 8-15) was kept unchanged. The author's track for Storm 1, 1900 is displayed in Fig. 3.

The hurricane status which Neumann et al. (1993) gave to this storm was fully verified by the content of a number of the items above and, indeed, the minimum pressure of 28.48 inches reported at Galveston was found to support major hurricane intensity. Very marked intensification was found to have occurred from the time the storm center passed near Key West in the evening of Sept. 5, a maximum wind velocity of 40 mph (item 21) and a minimum pressure of 29.42 inches (item 22) being reported there, and the time the steamship "Louisiana" passed very near the center of a fully developed hurricane about 1 P.M. Sept. 6, reporting winds in excess of 100 mph and a minimum pressure of 28.75 inches (item 34). Therefore, the author of this study decided to start denoting hurricane intensity along his track after the storm crossed the 25 degrees N. parallel early in the morning of Sept. 6; tropical storm intensity is denoted along the track prior to that time. Because of having been a major hurricane at landfall on the Texas coast in the evening of Sept. 8, hurricane intensity was kept until about 7 A.M. Sept. 9, when the storm center had moved over 100 miles inland. The hurricane status was then changed to the one corresponding to tropical storm. Finally, as in Neumann et al. (1993), the extratropical stage was introduced along the track after the storm reached the 40 degrees N. parallel in the morning of Sept. 11.

Storm 2, 1900 (Sept. 9-23), H.

The following information was found in relation to this storm: 1) The hurricane of Sept. 9-25 was first plotted a short distance S. of the Cape Verde Islands. From Sept. 9 to Sept. 13, this hurricane moved in a N.W. direction. It then reached a region where the general drift above the surface was from the S.W., when it recurved to the N.E., moving with the air currents aloft. During Sept. 15-16, pressure increased materially to the E. and N.E. of the hurricane and the direction of its course changed to W. on Sept. 16 evidently because the drift aloft had turned westward. During Sept. 13-17 an anticyclone moved rapidly to the E.S.E. from the Canadian N.W. to the Atlantic, in lat. 40 N., long. 40 W. On

the latter date the anticyclone was located a short distance N.W. of the center which evidently caused the winds aloft to blow to the S.W. The anticyclone then drifted towards the E. for 2 days, then slowly to the N.W. and finally to the N.E. The track of the cyclone, after it had moved S.W. for 2 days, was the usual broad, sweeping curve, as it skirted the western side of the anticyclone (Tannehill, 1938). Author's note: Tannehill (1938) showed a storm track and stated that C.L. Mitchell carefully investigated the movements of this storm. 2) Information extracted from 8 A.M. (E.S.T.) weather maps: Sept. 8, ship near lat. 10 N., long. 20 W., wind N.N.W. force 7, barometer 29.65 inches. Sept. 9, center of low placed near lat. 12 N., long. 22 W. Sept. 10, center of low placed near lat. 13 N., long. 27 W.; three ships around it, maximum wind force 6. Sept. 11, ship near lat. 14 N., long. 28 W., wind S.W. force 9; center of a low placed near lat. 15 N., long. 29.5 W. Sept. 12, ship near lat. 20 N., long. 36.5 W., wind N.N.E. force 4, barometer 29.88 inches; ship near lat. 21 N., long. 33 W., wind E. force 6, barometer 30.03 inches; ship near lat. 23 N., long. 33 W., wind E. force 5, barometer 30.06 inches; center of a low placed near lat. 16 N., long. 37 W. Sept. 13, ship near lat. 21 N., long. 33 W., wind S.W. force 10 (pressure could not be read off the map); ship near lat. 21 N., long. 37 W., wind N. force 4, barometer 29.91 inches; center of a low placed near lat. 21.5 N., long. 34 W. Sept. 14, center of a low near lat. 26 N., long. 36 W.; two ships showing light W. winds to the S. of the center. Sept. 15, center of low near lat. 29 N., long. 31 W.; no data around it. Sept. 16, center of low placed near lat. 28 N., long. 30 W.; no data in the vicinity of the center. Sept. 17, ship near lat. 28.5 N., long. 28 W., wind S. force 9, barometer 29.62 inches; center of a low placed near lat. 28.5 N., long. 29 W. Sept. 18, ship near lat. 28.7 N., long. 30.7 W., wind E.S.E. force 10, barometer 29.44 inches; center of a low near lat. 27.5 N., long. 31 W. Sept. 19, center of a low placed near lat. 26.5 N., long. 37 W.; a ship W. of the center showing N.E. wind; a second ship to the E. of the center showing S.E. wind force 7. Sept. 20, ship near lat. 27 N., long. 42 W., wind N.W. force 2, barometer 29.74 inches; center of a low placed near lat. 27 N., long. 42 W. Sept. 21, center of a low near lat. 30 N., long. 48 W.; no data near the center. Sept. 22, center of a low near lat. 30 N., long. 49 W.; no data in the immediate vicinity but winds in the periphery were weak. Sept. 23, center of a low placed near lat. 30 N., long. 52 W.; winds in the periphery were force 5. Sept. 24, center of the low could not be identified any longer (Historical Weather Maps, Sept. 1900). 3) Storm of Sept. 9-25. Atlantic (Tannehill, 1938). Author's note: Tannehill (1938) also included a track for this storm which is in line with the content of item 1). 4) A storm was first observed at lat. 12 N., long. 25 W. on Sept. 9, 1900 and lasted 16 days; it recurved at lat. 24 N., long. 33 W. and it was last observed at lat. 68 N., long. 20 E. (Mitchell, 1924). Author's note: Mitchell (1924) included a track which was found to be quite similar to the one shown in Tannehill (1938). However, the track in Mitchell (1924) did not show the loop which is displayed along the track in Neumann et al. (1993).

Information contained in the above items suggested the introduction of some modifications along the track for this storm

in Neumann et al. (1993). The modifications which were implemented by the author of this study were primarily based on ship observations contained in item 2) and on space-time continuity on days the storm traversed data voided areas. Although a ship observation in item 2) suggested that the storm already existed about 350 miles to the S.E. of the Cape Verde Islands on Sept. 8, the author's track was not started until Sept. 9 because of difficulties in accommodating storm positions within the limits of the tracking map before that date. Author's 7 A.M. positions were as follows: Sept. 9, near 11.3 degrees N., 22.0 degrees W.; Sept. 10, near 13.0 degrees N., 25.7 degrees W.; Sept. 11, near 15.0 degrees N., 28.3 degrees W.; Sept. 12, near 17.7 degrees N., 31.3 degrees W.; Sept. 13, near 22.0 degrees N., 33.5 degrees W.; Sept. 14, near 26.0 degrees N., 35.0 degrees W.; Sept. 15, near 29.7 degrees N., 32.3 degrees W.; Sept. 16, near 30.3 degrees N., 30.0 degrees W.; Sept. 17, near 29.0 degrees N., 29.0 degrees W.; Sept. 18, near 28.3 degrees N., 31.3 degrees W.; Sept. 19, near 26.5 degrees N., 36.5 degrees W. 7 A.M. positions in Neumann et al. (1993) for the period Sept. 20-23 were kept unchanged. The author's track for Storm 2, 1900 is shown in Fig. 3.

Rigorously speaking, the author of this study could not confirm the hurricane status which Neumann et al. (1993) gave to this storm. However, this status was maintained because two ship reports showing winds of force 9-10 were from the normally weak sector to the south of the center (item 2) and allowed one to infer the existence of much higher winds, attaining hurricane force, to the N.E. and E. of the center. As in Neumann et al. (1993), the author's track denotes hurricane intensity over the period Sept. 10-19, tropical storm status on Sept. 9 and Sept. 20 through Sept. 22, and a dissipating depression on Sept. 23.

Storm 3, 1900 (Sept. 11-15), T. S.

The following information was found about this storm: 1) A moderate disturbance without destructive energy first appeared S. of Cuba on the morning of Sept. 10. It reached the Louisiana coast by the evening of Sept. 12, reaching the southern New England coast on the morning of Sept. 16; it then moved N. to eastern Ontario where it was joined by another depression of nearly equal intensity (Monthly Weather Review, Sept. 1900). 2) Information extracted from 8 A.M. (E.S.T) weather maps: Sept. 10, Havana, wind S.E. force 3, barometer 29.86 inches; Cienfuegos, wind S.S.E. force 2, barometer 29.87 inches; Key West, wind N.E. force 3, barometer 29.91 inches; ship to the N.N.W. of Havana, wind N.E. force 6, barometer 29.94 inches. Sept. 11, Havana, wind E. force 4 (pressure could not be read off the map); Key West, wind E. force 3, barometer 29.96 inches; ship near lat, 21 N., long. 84.3 W., wind S.S.E. force 5, barometer 29.94 inches (probably too high). Sept. 12, Port Eads, wind E. force 5, barometer 29.96 inches; ship near lat. 28 N., long. 86.3 W., wind S.E. force 6, barometer 29.91 inches; center of a low placed near lat. 25.5 N., long. 89 W. Sept. 13, New Orleans, wind N.W. force 5; Pensacola, wind S.E. force 5; center of a low placed near lat. 30 N., long. 89.3 W. Sept. 14, Pensacola, wind S.W. force 4, barometer 29.82 inches; Montgomery, wind S.E. force

3, barometer 29.85 inches; Port Eads, wind S.W. force 3, barometer 29.77 inches (it seems to be too low); New Orleans, wind W. force 3, barometer 29.90 inches. Sept. 15, center of a low to the N.E. of Montgomery and to the W. of Atlanta (Historical Weather Maps, Sept. 1900). 3) Mobile, Sept. 13. A strong gale has been raging here since morning. The wind velocity reached 36 mph, the lowest barometer reading 29.69 inches (The New York Times, Sept. 14, 1900, p.3, col.3). 4) Washington, Sept. 13. Another storm of considerable energy is central tonight near the Alabama and western Florida coast. The storm was first noted Wednesday in the same locality and has remained stationary. The apparently tendency of the storm is slightly E. of N. (The New York Times, Sept. 14, 1900, p.3, col.3). 5) New Orleans, Sept 13. (Special). Another hurricane of alarming proportions is developing along the Gulf coast. The wind here tonight is terrific and is hourly growing stronger. Chief Moore of the Weather Bureau, at Washington, has telegraphed the local office warning all shipping to remain in port until further notice. Nearly all the wires in this section are down (The Morning Tribune, Tampa, Sept. 14, 1900, p.1, col.1). Author's note: The above dispatch was probably written during the night of Sept. 12. 6) The southern storm was moving very slowly with about the same energy and was central last night over southeastern Alabama. It has caused general rains from the Middle Gulf States northward through the southern portion of the Middle Atlantic States (The New York Times, Sept. 15, 1900, p.10, col.2). 7) The southern storm was moving slowly N.E. and was central last night in South Carolina (The New York Times, Sept. 16, 1900, p.3, col.4). 8) Sandy Hook, 9:30 P.M. Sept. 15, strong breeze from the E., raining and thick (The New York Times, Sept. 16, 1900, p.10, col.5). 9) Atlantic City, Sept. 16. In the heavy wind and rain storm which set in on the coast last evening the schooner "Willie" went ashore on the S.E. end of Egg Harbor Shoals. The schooner drove hard on the shoals before the heavy gale blew. A high sea was running and steadily grew more dangerously towards morning, when the wind veered and blew a gale from the S.E. The storm is the worst on the coast here this season (The New York Times, Sept. 17, 1900, p.1, col.5). 10) Some maximum wind velocities were as follows: Mobile, S. 36 mph on Sept. 13; Pensacola, S.E. 36 mph on Sept. 13; Savannah, S.W. 30 mph on Sept. 15; Wilmington, S.W. 27 mph on Sept. 15; Norfolk, N.W. 37 mph on Sept. 16; Atlantic City, S.W. 36 mph on Sept. 16 (Monthly Weather Review, Sept. 1900). 11) The southern and western storms have practically combined in Canada. There has been heavy rains from Virginia northward into southern New England (The New York Times, Sept. 17, 1900, p.5, col.4). Author's note: The above statement was probably issued in the evening of Sept. 16. 12) Storm of Sept. 12-13, 1900. Coastal areas of Louisiana, Mississippi and Alabama. Minor (Dunn and Miller, 1960). 13) Map showing a track for this storm. The following positions were read off the map: Sept. 10 (morning), lat. 21 N., long. 83 W. (a question mark is placed near this location); Sept. 12 (evening), lat. 28.7 N., long. 90.3 W. (a question mark is placed near this location); Sept. 13 (morning and evening), near Mobile; Sept. 14 (morning), near lat. 32 N., long. 88.5 W.; Sept. 14 (evening), near lat. 32 N., long. 86.5 W.; Sept. 15 (morning), near lat. 33.7 N., long. 84.5 W.; Sept. 15 (evening),

near lat. 33.5 N., long. 82 W.; Sept. 16 (morning), near lat. 40.5 N., long. 72 W. (Monthly Weather Review, Sept. 1900).

Based on information in the above items, some modifications were introduced to the track for this storm which is shown in Neumann et al. (1993) and was started over Cuba on Sept. 10. No morning position could be inferred from the available data for Sept. 10 in item 2) and, in addition, the cyclone catalogs in Sarasola (1928) and Martinez-Fortun (1942) showed no storm to have affected Cuba around Sept. 10, 1900. Thus, the author of this study decided to start his track for Storm 3, 1900 with his 7 A.M. Sept. 11 position which was estimated near 22.0 degrees N., 87.0 degrees W. on the basis of a ship observation for that day in item 2) and some space-time continuity as applied backwards in time, using the author's 7 A.M. Sept. 12 position. This latter position was estimated near 26.0 degrees N., 89.3 degrees W. on the basis of information for that day contained in item 2). The two positions above were found to be about 300 miles to the S.S.E. and about 120 miles to the S.S.E. of the positions in Neumann et al. (1993) for Sept. 11 and Sept. 12, respectively. The author's Sept. 13 position was near 30.0 degrees N., 89.0 degrees W. and was primarily based on information in items 2) and 3); this position was found to be about 40 miles to the S.W. of the corresponding one on Neumann et al. (1993). 7 A.M. positions for Sept. 14-15 in the latter publication were kept unchanged. Information in items 1), 9) and 13) suggested a very fast movement of the storm during late Sept. 15 and early Sept. 16, bringing the center to the southern New England coast by 7 A.M. Sept. 16. As the storm was apparently centered over South Carolina in the evening of Sept. 15 (item 7), it would have had to move at an average rate of roughly 50 mph over the period from 7 P.M. Sept. 15 to 7 A.M. Sept. 16. The author believes that this is very unlikely to have occurred because it would have implied a tremendous acceleration of the previous storm motion; therefore, he believes that what actually occurred was the formation of a new cyclonic center well to the N. of the old center of the weakening storm and that such a new center was the one affecting Atlantic City (item 9) and explaining the occurrence of a wind maximum of 27 mph from the S.W. at Wilmington N.C. on Sept. 15 (item 10). Under the above circumstances, the author of this study decided to terminate his track for this storm on Sept. 15. Such a track is displayed in Fig. 3.

The pressure of 29.69 inches reported in item 3) appears to support the tropical storm status which Neumann et al. (1993) gave to this storm. However, on the basis of the maximum wind velocities of 36 mph (5-minute averaged winds) reported at Pensacola and Mobile (item 10), Storm 3, 1900 seems to have been a rather weak tropical storm.

Storm 4, 1900 (Sept. 13-18), H.

The following information was found about this storm: 1) The storm was first reported by the captain of the steamship "Hungaria" in lat. 21 N., long. 60 W. on Sept. 13. It moved slowly northward, apparently passing westward and close to the Island of Bermuda on the evening of Sept. 13. It moved more rapidly during the night of